

TELEVISION SYSTEM WITH AIDED
USER PROGRAM SEARCHING

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This application claims the benefit of
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5 filed July 17, 1998.

Background of the Invention

This invention relates to television systems,
and more particularly, to television systems such as
10 interactive television program guide systems having
aided user program searching.

Cable, satellite, and broadcast television
systems provide a large number of television channels.
Typically, the number of channels provided by cable and
15 satellite systems is over a hundred and ever
increasing. Television viewers have traditionally
consulted printed television program schedules to
obtain programing information. More recently,
interactive electronic television program guides have
20 been developed to allow television program information
to be displayed on viewer television equipment.

Interactive electronic television program
guides ("program guides") typically provide program
listings of all channels available in the television

system. Some program guides include features for allowing users to scan through channel information or programs in order to select a program to access.

As detailed in Knee et al. U.S. Patent No.

5 5,589,892, a program guide may include browse and flip for user program searching. The browse feature presents a browse overlay region on the user's television screen that contains a program listing. The user may use up and down arrow keys take action from a
10 user input interface device to direct the browse overlay to scan the listings on other channels while remaining tuned to the current channel. This allows the user to browse available program listings without missing any of the program on the current channel. The
15 flip feature presents a flip overlay region on the user's television screen that contains a program listing. The user may flip through these listings. As the user changes channels, the program listing in the flip display region is updated to match the program on
20 the current channel. With either the browse or flip feature, finding a suitable program for viewing may require scanning through individual program listings for numerous channels. Scanning through such a large number of channels to find a suitable program for
25 viewing may be time-consuming and cumbersome.

It is therefore an object of the present invention to provide a television system that monitors a user's television viewing activity and suggests programs for the user to view.

30 Is it also an object of the present invention to provide a television system that displays suggested program listings and that allows the user to browse the

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suggested program listings using an adaptive browse feature.

It is also a further object of the present invention to provide a television system that displays suggested program listings and that allows the user to flip through the suggested listings using an adaptive flip feature.

Summary of the Invention

These and other objects of the invention are accomplished in accordance with the principles of the present invention by providing a system that monitors the television viewing of a user. The system determines the user's interests from the user's viewing activities and displays program listings for suggested programs. The user may browse through suggested program listings using an adaptive browse feature or may flip through suggested program listings using an adaptive flip feature.

The system maintains a database of program listings. The database may be maintained on each user's television equipment (e.g., on each user's set-top box), may be maintained on a central server (e.g., at the user's cable system headend) or other suitable platform. Each program listing has associated program attributes such as genre (comedy, movies, sports, etc.), rating (TV-G, PG, etc.), critic's rating (one star, two stars, etc.), actors, scheduled program length, and other related parameters that can be tagged to a program. The system may compare the attributes of the programming that is viewed by the user with the attributes associated with the program listings in the

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The user may flip through suggested program listings using an adaptive flip feature. The adaptive flip feature displays an adaptive flip region on the user's television screen as the current television program is displayed. The adaptive flip region contains a suggested program listing. The user may scan through suggested program listings by taking actions from a user input interface device. Each time a user requests another suggestion, the system displays the next available suggested program listing, tunes the user's television equipment to that channel, and displays the program that is currently on that channel.

The system may be implemented by integrating the adaptive flip and adaptive browse features into an interactive television program guide. The adaptive flip and browse features may also be implemented as part of other applications or as part of a stand-alone application.

If the system supports both regular flip and browse features (in which all available programs listings are presented) and adaptive browse and flip features (in which only suggested program listings are presented), the user may be provided with an opportunity selectively enable the adaptive flip and browse features. The adaptive flip and browse features may be invoked using dedicated keys, certain combinations of keys, switches, menu options, or any other suitable technique. When the adaptive flip and browse features have been turned on, these features may be invoked in the same ways that regular flip and browse features are invoked.

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FIG. 5 is a flow chart of illustrative steps involved in providing an embodiment of an adaptive browse feature in accordance with the present invention.

5 FIG. 6 is a diagram illustrating an adaptive browse display region on a television screen, an adaptive browse display screen on a television screen that may be provided when a "right" navigation key of a remote control is pressed, and an adaptive browse
10 display region on a television screen that may be provided when a "down" navigation key of a remote control is pressed in accordance with the present invention.

 FIG. 7 is a flow chart of illustrative steps
15 involved in providing an adaptive browse display region in response to user selection of a remote control navigation key in accordance with the present invention.

 FIG. 8 is a diagram illustrating an adaptive
20 browse display region and an on-screen adaptive browse confirmation on a television screen that may be provided after a user presses a sequence of remote control keys in accordance with the present invention.

 FIG. 9 is a diagram illustrating a browse
25 display region and an on-screen adaptive browse confirmation on a television screen that may be provided after a user presses a sequence of remote control keys in accordance with the present invention.

 FIG. 10 is a diagram illustrating an adaptive
30 browse display screen having an adaptive browse display region and a compressed video display region in accordance with the present invention.

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FIG. 11 is a diagram illustrating a navigator display screen, a browse setup display screen that may be provided when a user selects browse setup, and a television screen that may be provided when a browse setup display screen is exited in accordance with the present invention.

FIG. 12 is a flow chart of illustrative steps involved in providing an on-screen confirmation of adaptive browse mode in accordance with the present invention.

FIG. 13 is a flow chart of illustrative steps involved in providing an adaptive browse display region based on attributes of the currently displayed program in accordance with the present invention.

FIG. 14 is a flow chart of illustrative steps involved in providing an adaptive browse display region based on attributes of the last displayed program in accordance with the present invention.

FIG. 15 is a flow chart of illustrative steps involved in providing a list of programs for an adaptive browse display region based on attributes of user-viewed programs in accordance with the present invention.

FIG. 16a is a flow chart of illustrative steps involved in providing a list of programs based on the currently displayed program in accordance with the present invention.

FIG. 16b is a flow chart of illustrative steps involved in providing a list of programs based on a previously displayed program in accordance with the present invention.

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FIG. 16c is a flow chart of illustrative steps involved in providing a list of programs based on television viewing habits in accordance with the present invention.

5 FIG. 17 is a diagram of an illustrative navigator display screen, a setup display screen that may be provided when "setup" is selected, and an adaptive browse criteria settings display screen in accordance with the present invention.

10 FIG. 18 is a flow chart of illustrative steps involved in providing a list of programs using an adaptive learning algorithm in accordance with the present invention.

15 FIG. 19 is a flow chart of illustrative steps involved in providing a trained neural network in accordance with the present invention.

20 FIG. 20 is a diagram of an illustrative navigator display screen, a setup display screen that may be provided when "setup" is selected, and an adaptive browse criteria settings display screen in accordance with the present invention.

25 FIG. 21 is a diagram of an illustrative adaptive browse criteria settings display screen that may include a user-selectable adjust trained neural network portion, an adaptive browse criteria settings display screen that may be provided when the adjust trained neural network option is selected, and an adaptive browse criteria settings display screen that may be provided when an add/select option is selected
30 in accordance with the present invention.

FIG. 22 is a diagram illustrating an adaptive flip display region on a television screen, a

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corresponding adaptive flip display region on a television screen that may be provided when a channel-up key of a remote control is pressed, and an adaptive flip display screen that may be provided when the
5 channel-up key of the remote control is pressed again in accordance with the present invention.

FIG. 23 is a diagram illustrating an adaptive flip display screen having an adaptive flip display region with a compressed video display region, an
10 adaptive flip display screen having an adaptive flip display region and a compressed video display region that may be provided when an a channel-up key of the remote control is pressed, and a television screen that may be provided when a program is selected for viewing
15 in accordance with the present invention.

FIG. 24 is a flow chart of illustrative steps involved in providing an adaptive flip feature in accordance with the present invention.

FIG. 25 is a diagram illustrating a navigator display screen, a flip setup display screen that may be
20 provided when flip setup is selected, and a television screen that may be displayed after the flip setup display screen is exited in accordance with the present invention.

25 FIG. 26 is flow chart of illustrative steps involved in providing an on-screen confirmation of adaptive flip mode in accordance with the present invention.

FIG. 27 is a diagram of an illustrative
30 navigator display screen, a setup display screen that may be provided when "setup" is selected, and an

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adaptive flip criteria settings display screen in accordance with the present invention.

FIG. 28 is a diagram illustrating a navigator display screen, a setup display screen that may be provided when "setup" is selected, and an adaptive flip criteria settings display screen in accordance with the present invention.

FIG. 29 is a diagram illustrating an adaptive flip criteria settings display screen that may include a user-selectable adjust trained neural network option, an adaptive flip criteria settings display screen that may be provided when the adjust trained neural network option is selected, and an adaptive flip criteria settings display screen that may be provided when an add/select option is selected in accordance with the present invention.

FIG. 30 is a diagram illustrating a grid display screen that is displayed when an "other shows" option is selected, a pop-up display region that is displayed when a list option is selected, and a grid display region.

Detailed Description of the Preferred Embodiments

An illustrative interactive television program guide system 50 in accordance with the present invention is shown in FIG. 1. Main facility 52 includes a program guide database 54 for storing program guide information (e.g., television program listings data, program-related information, service listings data, service-related information, pay-per-view ordering information, television program promotional information, etc.).

Main facility 52 preferably includes a processor to handle information distribution tasks. Information from database 54 may be transmitted in parallel via communication links such as communication link 58 to multiple television distribution facilities such as television distribution facility 56. Only one television distribution facility is shown in FIG. 2 to avoid over complicating the drawings. Each communication link 58 may be a satellite link, a telephone network link, a combination of such links, or another suitable communication path. Text, graphics, and video data signals may be transmitted over link 58. If it is desired to transmit video signals over communication link 58, a relatively high bandwidth link such as a satellite link is generally preferable to a relatively low bandwidth link such as a telephone line.

Television distribution facility 56 is a facility such as a cable system headend, a broadcast distribution facility, or a satellite television distribution facility for distributing television signals to viewers.

The program guide information transmitted by main facility 52 to television distribution facility 56 includes television program listings data such as program times, channels, titles, descriptions, etc. Transmitted program guide information may include pay program data such as pricing information for individual programs and subscription channels, time windows for ordering programs and channels, telephone numbers for placing orders that cannot be impulse ordered, etc.

Television distribution facility 56 may distribute program guide information received from main

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5 monitor viewing activities, analyze these activities
and display appropriate program listings information
for the user.

10 other suitable link, or a combination of such links.
Any suitable communications scheme may be used to
transmit data over paths 60, including in-band
transmissions, out-of-band transmissions, digital
transmissions, analog transmissions, cable
15 transmissions, satellite transmissions, over-the-air
transmissions, multichannel multipoint distribution
services (MMDS) transmissions, etc.

20 facility 56 to distribute television programming,
program listings information, advertisements, and other
information to user television equipment 58. Multiple
television and audio channels (analog, digital, or both
analog and digital) may be provided to user television
25 equipment 58 via communication paths 60. If desired,
some of the data may be distributed to user television
equipment 58 by one or more distribution facilities
that are separate from television distribution facility
56 using communication paths that are at least partly
30 separate from communication paths 60.

The data distribution technique that is used to distribute data on paths 60 may depend on the type

of information that is being distributed. For example, text and graphics may be distributed over an out-of-band channel using an out-of-band modulator or distributed in the vertical blanking interval lines of an analog video channel. Video information may also be distributed in this way, although large quantities of video information may be more efficiently distributed using one or more digital channels or streams on paths 60. Such digital channels or streams may also be used for distributing text and graphics.

Each user television equipment device 58 has a receiver which is typically a set-top box such as set-top box 62. The receiver may also be other suitable television equipment such as an advanced television receiver into which circuitry similar to set-top-box circuitry has been integrated or a personal computer television (PC/TV). For illustrative purposes, the present invention will be described in the context of user television equipment 58 that uses set-top boxes.

Each set-top box 62 preferably contains a processor to handle tasks associated with implementing an application on the set-top box 62 that assists the user in searching for programs related to the programs the user is watching. For example, a stand-alone application may be provided that supports adaptive browse and adaptive flip modes, as described more fully below. If desired, these tasks may be implemented using a program guide application. For clarity, the present invention will be described primarily in the context of such a program guide application and in the context of a program guide system. However, many

aspects of the invention may be practiced in other types of systems or with other types of applications if desired.

Each set-top box 62 is typically connected to
5 an optional videocassette recorder 66 so that selected television programs may be recorded. Videocassette recorder 66 is typically connected to a television 68. To record a program, set-top box 62 tunes to a particular channel and sends control signals to
10 videocassette recorder 66 (e.g., using infrared transmitter 70) that instructs video cassette recorder 66 to start and stop recording at the appropriate times.

Television program listings, advertisements,
15 programming information, and other information may be displayed on television 68. Set-top box 62, videocassette recorder 66, and television 68 may be controlled using one or more remote controls or may be controlled using any other suitable user input
20 interface device such as a wireless keyboard, mouse, trackball, dedicated set of keys, etc.

Certain program guide features, such as pay program purchasing, the purchasing of products or services, and data collection functions, may require
25 that user television equipment 58 transmit data to television distribution facility 56 over communications paths 60. If desired, such data may be transmitted over telephone lines or other separate communications paths. If features such as these are provided using
30 facilities separate from television distribution facility 56, some of the communications involving user

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television equipment 58 may be made directly with the separate facility (not shown).

If desired, an interactive television program guide may be implemented using a data-relay architecture. In such an architecture, television distribution facility 56 may serve as a data relay site and user television equipment 58 may be a data destination site. For example, as television distribution facility 56 receives information from main facility 52, television distribution facility 56 may continuously or periodically distribute information to user television equipment 58. In a data-relay architecture, a program guide implemented on user television equipment 58 may use a database (e.g., database 64) for storing program guide information at user television equipment. Program guide information may include program listings and program attributes. Program attributes may be information such as program title, program actors, program duration, program genre (e.g., sports, comedy, movies, etc.), program channel, scheduled program duration, program rating (e.g., TV-G, PG-13, etc.), program content rating (or critics' rating or star rating, e.g., 1 star, two stars, etc.) and other related parameters that can be tagged to a program. Television distribution facility 56 may also poll set-top boxes periodically for certain information (e.g., pay program account information or information regarding programs that have been purchased and viewed using locally-generated authorization techniques).

The features of the present invention may be implemented in a client-server arrangement or in a combination client-server and data-relay arrangement.

For clarity, the present invention is sometimes described primarily in the context of program guides that are implemented on user television equipment rather than in the context of program guides that are implemented partially on a server and partially on user television equipment or a more fully server-based architecture.

For illustrative purposes, the present invention is discussed in the context of using a remote control for the user input interface device. An illustrative remote control 80 is shown in FIG. 2. Remote control 80 may include up-navigation key 82, down-navigation key 84, right-navigation key 86, left-navigation key 88, OK key 90 (also sometimes called an enter or select key -- for clarity all of which are referred to as an OK key), channel-up key 92, channel-down key 94, switch 96, adaptive browse function key 98, adaptive flip function key 100, numeric key pad 102, and dedicated function keys 104a, 104b, and 104c. Navigation keys 82, 84, 86, and 88 may also be known as arrow keys. Other remote control keys may include an information "INFO" key, a record key, a volume control key, etc.

A highlight window in a program guide display screen may be moved in a desired direction using navigation keys 82, 84, 86, and 88. Data entry may be accomplished using OK key 90. Channel tuning control may be accomplished using channel-up and channel-down keys 92 and 94. Switch 96 may have plural positions for providing predetermined program guide modes or settings. Numeric key pad 102 may include number keys (not shown) for entry of numbers when necessary.

Adaptive browse function key 98 and adaptive flip function key 100 may provide dedicated control of adaptive browse and adaptive flip modes respectively. Access to the adaptive flip and adaptive browse modes may be accomplished using keys other than adaptive browse function key 98 and adaptive flip function key 100. Dedicated button keys 104a, 104b, and 104c may have dedicated functionality for reducing the number of keys necessary for accessing program guide features. Use and operation of remote control keys are further discussed below in relation to program guide display screen and program guide control.

As shown in FIG. 3, the program guide of the present invention may display illustrative adaptive browse display region 110 on illustrative television display screen 112, illustrative adaptive browse display region 114 on illustrative television display screen 116, and illustrative television screen 118. Television screen 112 may include video for a program, Star Trek Deep Space Nine, airing on a currently-tuned channel. When a user presses an adaptive browse function key on a remote control 80, adaptive browse display region 110 may be displayed on television screen 112. Adaptive browse display region 110 may provide program listing information while television screen 112 continues to include video of the program airing on the currently tuned channel, Star Trek Deep Space Nine.

Adaptive browse display region 110 may be displayed when a user presses an adaptive browse function key on remote control 80. Adaptive browse display region 110 may include time portion 120,

Time window portion 126 may include information identifying a program listing time window. Time window portion 126 may also include on-screen confirmation of browse or adaptive browse mode. Channel identification portion 122 may include an identification of a channel. Initially, channel identification portion 122 may include an identification of the currently tuned channel. Program information portion 124 may include information on a program airing on the channel identified in channel identification portion 122 in the time window identified in time window portion 126.

Initially, program information portion 124 may include information on the current program being watched when adaptive browse display region 110 is invoked, Star Trek Deep Space Nine on channel 9. Time portion 120 may include an indication of the current time. Right-direction portion 132 may include a right direction arrow indicating that information on a future time window is available. Up-direction portion 128 and down-direction portion 130 may include direction arrows indicating up and down channel browse availability. During the display of adaptive browse display region 110, the system may monitor the viewing activity of the user to determine one or more program attributes of the programming viewed by the user. For example, if the

Adaptive browse display screen 114 may be displayed on television screen 116 when a user selects an up-navigation key 82 on a remote control 80 from adaptive browse display region 110. As in television screen 112, television screen 116 includes video of the program airing on the currently tuned channel, Star Trek Deep Space Nine on channel 9. Adaptive browse display screen 114 may include program information portion 134 that contains a viewing suggestion for a

opportunity to set a reminder to view the program identified in program information region 166. Record option 170 may provide an opportunity to automatically record the program identified in program information
5 region 166. Order option 165 may provide an opportunity to order the upcoming program (e.g., pay per view program).

Illustrative steps involved in providing an adaptive browse feature such as the adaptive browse
10 feature of FIG. 3 and FIG. 4 are shown in FIG. 5. Initially, the user adjusts any adjustable adaptive browse settings and begins to watch television. At step 172, the program guide monitors the viewing and program guide activity of the user. Step 172 may
15 involve determining which programs the user is watching (substep 172a), determining when and for how long the user is watching certain programs (substep 172b), determining the program attributes of the programs being viewed (step 172c), and determining if the user
20 has selected the current program to be used in building a list of programs (step 172d). The program attribute for the programs being viewed are stored in a database such as program listings database 64 of FIG. 1. When the user invokes the adaptive browse feature, the
25 system builds a list of programs from a program listings database such as program listings database 64 of FIG. 1 whose program attributes match (or are otherwise similar to) the program attributes of programming viewed by the user. The programming viewed
30 by the user may be the current program being viewed the last program viewed for a substantial length of time, or may be general programming that the user has viewed.

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The list may be built when the adaptive browse feature is first activated concurrently with step 172, or at any other suitable time. At step 174, the program guide may display an adaptive browse display region.

- 5 The adaptive browse region may include a program listing for one of the programs on the list that was built at step 172. The program listings may be for either a current program or a future program. The program listing may be selected by a user. When a user
10 selects a program listing for a current program, the program guide may tune to the channel airing the current program at step 176. When a user selects a program listing for a future program, the program guide may display one or more user-selectable options related
15 to the future program at step 178.

- Another way in which the user may invoke and use the adaptive browse feature is by pressing a dedicated adaptive browse function key whenever the user presses a navigation cursor key. This is shown in
20 FIG. 6. As shown in FIG. 6, the program guide of the present invention may display illustrative adaptive browse display region 180 on illustrative television screen 182, illustrative adaptive browse display region 184 on illustrative television screen 186, and
25 illustrative adaptive browse display region 188 on illustrative television screen 190. Television screen 182 may include video of a program airing on a channel currently tuned to and being watched when adaptive browse display region 180 is invoked. Television
30 screen 182 may include video of a program, Star Trek Deep Space Nine, airing on a currently tuned channel, KTVJ channel 10. When a user presses an adaptive

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browse function key and a navigation key of a remote control, adaptive browse display region 180 may be displayed on television screen 182. Adaptive browse display region 180 may include a program listing portion 192 for Star Trek Deep Space Nine. Program listing portion 192 may include a program information portion and a program channel identification portion. Adaptive browse display region 180 may also include current time portion 194 and time window portion 196. Time window portion 196 identifies the program listing time window of interest (e.g., the 8:00 PM time window). Current time portion 194 may indicate the current time (e.g., 8:45 PM).

When a user selects an adaptive browse function key and a right-navigation key from adaptive browse display region 180, adaptive browse display screen 184 may be displayed on television screen 186. As in television screen 182, television screen 186 may include video of the program airing on the currently tuned channel, Star Trek Deep Space Nine on channel 10. Adaptive browse display region 184 may include time window portion 198 identifying the program listing time of window of interest to be the 9:00 PM time window. Adaptive browse display region 184 may include program listing portion 200. Program listing portion 200 may identify a program, the movie Unforgiven starring Clint Eastwood on WKIK channel 22, as a viewing suggestion for the 9:00 PM time window based on the fact that the user was watching Star Trek Deep Space Nine (both programs involve action/adventure).

Adaptive browse display screen 188 may be displayed on television screen 190 when a user selects

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an adaptive browse function key and a down-navigation key from adaptive browse display region 184. As in television screens 182 and 186, television screen 190 may include video of the program airing on the currently tuned channel, Star Trek Deep Space Nine on channel 10. Adaptive browse display region 188 may include time window portion 199 identifying the program listing time window of interest to be the 9:00 PM time window. Adaptive browse display region 188 may include program listing portion 202. Program listing portion 202 may identify another program, Pale Rider on WOX channel 8, as another viewing suggestion for the 9:00 PM time window based on the fact that Pale Rider and Star Trek Deep Space Nine are both programs that involve action/adventure. From adaptive browse display region 188, an OK key may be selected to access user-selectable options such as record and set-reminder options related to Pale Rider on WOX channel 8 at 9:00 PM.

Thus, in addition to illustrating how a user may invoke and use the adaptive browse feature with a different set of remote control keys, the example of FIG. 6 shows how the user may view suggested program listings for various future programs (based on the programming viewed by the user) by using the right arrow key to move to a future time slot and subsequently using the up/down arrow keys to browse the listings in that slot that are related to the programming viewed by the user (e.g., the current program, the last program viewed, or various programs recently viewed by the user).

Illustrative steps involved in providing an adaptive browse feature such as the adaptive browse feature of FIG. 6 are shown in FIG. 7. At step 204, an adaptive browse display region may be displayed in response to user actions. Initially, program listing information for the program airing on the currently tuned channel may be included in the adaptive browse display region. At step 208, When a user presses an up or down navigation key alone or in combination with other keys such as an adaptive browse function key (FIG. 6), an adaptive browse display region for a currently scheduled program on another channel may be displayed. At step 206, when a user presses a right-navigation key alone or in combination with other keys such as an adaptive browse function key (FIG. 6), an adaptive browse display region for a future-scheduled program may be displayed. At step 210, when a user presses a left-navigation key alone or in combination with other keys such as an adaptive browse function key (FIG. 6), an adaptive browse display region for an earlier scheduled program may be displayed. A program listing for a currently scheduled program, for an earlier-scheduled program, or for a future-scheduled program may be determined for an adaptive browse display screen based on characteristics of user-viewing activity. Additional adaptive display regions for currently scheduled, earlier-scheduled, or future-scheduled programs may be displayed in response additional remote control key strokes.

If desired, the adaptive browse feature may be invoked using a remote control switch 96 of FIG. 2. As shown in FIG. 8, the program guide of the present

invention may display illustrative adaptive browse display region 212 on illustrative television screen 214. Adaptive browse display region 212 may be invoked when a user sets a remote control switch and presses a navigation key. Television screen 214 may include video of Star Trek Deep Space Nine which commenced airing on the currently tuned channel, KDND channel 9, at 8:00 PM and was being watched when adaptive browse display region 212 was invoked. Television screen 214 may include an on-screen adaptive browse confirmation portion 216. On-screen adaptive browse confirmation portion 216 may indicate that the adaptive browse feature has been enabled. On-screen adaptive browse confirmation portion 216 may be in the form of text (e.g., ADAPTIVE BROWSE ON). An on-screen adaptive browse confirmation indicator may be provided whenever desired, regardless of which technique is used to invoke or enable the adaptive browse feature.

As shown in FIG. 9, the adaptive browse feature may be invoked when the user presses an adaptive browse function key (such as adaptive browse function key 98 of FIG. 2) and a navigation key (such as one of navigation keys 82, 84, 86, and 88 of FIG. 2). the program guide of the present invention may display illustrative adaptive browse display region 218 on illustrative television screen 220. Adaptive browse display region 218 may be invoked when a user presses an adaptive browse function key and a navigational key on a remote control. Television screen 220 may include video of Star Trek Deep Space Nine which commenced airing on the currently tuned channel, KDND channel 9, at 8:00 PM and was being watched when adaptive browse

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Illustrative steps involved in providing an adaptive browse display region in which the suggested program listing is based on the current program the user is watching are shown in FIG. 13. At step 270, the program guide (or other application) may determine which program listings in the program listings database (e.g., program listings database 64 of FIG. 1) have associated attributes (such as genre, rating, actors, etc.) that best match those of the currently displayed program. At step 272, an adaptive browse display region may be displayed for each of the matching program listings.

Illustrative steps involved in providing an adaptive browse display region in which the suggested program listing is based on the last displayed program are shown in FIG. 14. At step 274, the program guide (or other application) may determine which program listings in the program listings database (e.g., program listings database 64 of FIG. 1) have associated attributes matching those of the last displayed program. The last displayed program is the last program which was viewed in substantial length (e.g., 150 minutes or more, or 75% of its length). At step 276, an adaptive browse display region may be displayed for each of the matching program listings.

30 Illustrative steps involved in providing an adaptive browse display region in which the suggested program listing is based on programs recently viewed by the user are shown in FIG. 15. At step 278, the

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among other user-selectable options. Adaptive browse criteria settings option 304 may be selected by positioning highlight window 306 on adaptive browse criteria settings option 304 and pressing an OK key.

Adaptive browse criteria settings display screen 298 may be displayed when a user selects adaptive browse criteria setting option 304. Adaptive browse criteria settings display screen 298 may include select algorithm option 310. Select algorithm option 310 may provide an opportunity to select as the algorithm to be used in building a list of programs an algorithm based on (for example): (a) current program attributes, (b) last-viewed program attributes, or (c) attributes determined using an adaptive learning algorithm. The user may use option 310 to select one of these three types of algorithms. When the selected algorithm is set to current program attributes or last displayed program attributes, adaptive browse criteria settings display screen 298 may include criteria settings display region 308. Criteria setting display region 308 may include a list of program attribute criteria (e.g., genre, title, actor, channel, rating, scheduled duration, etc.) and adjustable importance settings (weights) associated with each criteria. Importance settings may be modified using a remote control or other suitable user input interface (e.g., track ball).

Adaptive browse criteria settings display screen 298 may include learning time option 312.

30 Learning time option 312 may be used to set the minimum viewing duration of a current or last-viewed program before the attributes of the program may be used to

adaptive browse criteria settings option 334 and other user-selectable options. Adaptive browse criteria settings option 334 may be selected by positioning highlight window 336 on adaptive browse criteria settings option 334 and pressing an OK key.

Adaptive browse criteria settings display screen 328 may be displayed when a user selects adaptive browse criteria setting option 334. Adaptive browse criteria settings display screen 328 may include select algorithm option 338. Select algorithm option 338 may provide an opportunity to select the algorithm to be used in building a list of programs using current displayed program attributes, last displayed program attributes, or a neural network. When the selected algorithm is the neural network algorithm as shown in FIG. 20, adaptive browse criteria settings display screen 328 may include neural network criteria setting display region 340. Criteria setting display region 340 may include a list of selectable options related to user viewing activity. These may include program attributes such as genre, title, actor, channel, rating, and scheduled duration, and other criteria such as percentage of program viewed, etc. Criteria setting display region 340 may include status settings associated with each characteristic. Status settings may be set to be either enabled or disabled. When a status setting is set to be enabled, the characteristic associated with the status setting may be used in the neural network.

Adaptive browse criteria settings display screen 328 may include learning time option 342. Learning time option 342 may be used to set the minimum

viewing duration of a program before the program related characteristics are used in training the neural network. The user may have the opportunity to override the minimum viewing duration by selecting option 133 of FIG. 3 for manually selecting the current program for training the neural network without waiting the minimum viewing duration. To build a list of programs, program attributes, and the characteristics of viewed programs are applied to the neural network to train the neural network. Subsequently, the characteristics of various current and future programs may be applied to the trained neural network. The resulting output of the trained network provides an indicator of the likelihood of user interest in those programs.

Adaptive browse criteria settings display screen 328 may include user identification option 344 for associating different settings with each user. User identification option 344 may identify the displayed settings to be associated with user Mike. A user may select user identification option 344 and scan through a list of users. In addition, user identification portion 344 may be used to log in a user to commence training the neural network based on the programs that are viewed by the user. A user may alternatively log in from a separate log-in display screen, a set-up menu, etc.

Another way in which users may adjust the network is shown in FIG. 21. As shown in FIG. 21, the program guide of the present invention may display illustrative adaptive browse criteria display screen 348 and illustrative adaptive browse criteria settings display screen 350. Adaptive browse criteria settings

display screen 348 may include adjust neural network training option 352. Adjust neural network training option 352 may be selected by positioning a highlight window on adjust neural network training option 352 and
5 pressing an OK key. In response, adaptive browse criteria settings display screen 350, which has adjustment option 354, may be displayed. Adjustment option 354 may include a list of programs viewed by a user and a rating associated with each program on the
10 list. Each rating may be set or adjusted by a user to fine tune the performance of the trained neural network. Adaptive browse criteria setting display screen 350 may include add/select option 353 for adding a program as a training stimulus or selecting to ignore
15 certain programming in training the neural network (e.g., news, sports, etc.). When a user selects add/select option 353, adaptive browse criteria setting display screen 349 may be displayed. Display screen 349 may include add/select region 351 which provides
20 the user with an opportunity to identify a program to be used in training the neural network or to select types of programs to ignore in training the neural network.

The foregoing discussion has focused on the
25 use of adaptive browse displays, which allows a user to browse suggested program listings on channels and at times other than the time and channel of the current program being watched while still displaying the current program. Another aspect of the invention
30 relates to adaptive flip displays in which the user is presented with suggested listings while changing channels.

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Television screen 358 may include on-screen
25 confirmation portion 390. On-screen confirmation
portion 390 may be in the form of text or other
suitable form of on-screen confirmation of the adaptive
mode.

If desired, the adaptive flip feature may be
30 provided in a configuration in which the current
program is shown in a reduced size video window. As
shown in FIG. 23, the program guide of the present

invention may display illustrative television screen 392 having illustrative adaptive flip display region 394 and illustrative video display region 396, illustrative television screen 398 having illustrative adaptive flip display region 400 and illustrative video display region 402, and illustrative television screen 420. Video display region 396 of television screen 392 may include a reduced-size video of a program airing on the channel currently tuned to and being watched when adaptive flip display region 394 was invoked. Adaptive flip display regions such as adaptive flip display region 394 typically have room for more information or options than adaptive flip display regions such as adaptive flip display region 348 of FIG. 22. Adaptive flip display region 394 may include time portion 406, channel identification portion 408, program information portion 410, up-direction portion 412, down-direction portion 414, and on-screen confirmation portion 416, and user-selectable options portion 418.

When the adaptive flip feature is invoked, channel identification portion 408 includes an identification of the currently tuned channel. Program information portion 410 includes information on the program airing on the channel identified in channel identification portion 408 (e.g., Star Trek Deep Space Nine on KDND channel 9). The channel listed in channel identification portion 408 is the same channel that is displayed in video display region 396. Time portion 406 may include an indication of the current time. Up-direction portion 412 and down-direction portion 414

may include direction arrows indicating up and down channel flip availability.

On-screen confirmation portion 416 may provide a confirmation that the adaptive flip feature
5 has been activated. If the program guide supports both a regular flip feature (that tunes all channels) and an adaptive flip feature, on-screen confirmation 416 may provide a confirmation when the flip feature is in adaptive mode. User-selectable options portion 418 may
10 include user-selectable program guide options. Such options may allow the user to set parental controls, set favorites, etc.

Television screen 398 having an adaptive flip display region 400 and video display region 402 may be
15 displayed when the user presses an up-navigation key of a remote control while adaptive flip display region 394 is displayed. Adaptive flip display region 400 may include program information portion 404. Program information portion 404 may include information on a
20 suggested program (Babylon 5) for a viewing in the current time window. The program, Babylon 5, may be identified as a viewing suggestion based on the user's viewing activity. Program information portion 404 may include the scheduled time and duration of the program.
25 Channel identification portion 406 of adaptive flip display region 398 may include an identification of the channel, WKAX channel 112, associated with the program, Babylon 5. Simultaneous to displaying adaptive flip display region 400, the system tunes to the channel
30 associated with the program (KAB channel 120) and displays the program in video display region 402. The program may be displayed as a reduced size video. Up-

direction portion 388 and down-direction portion 386 may be used to indicate availability of the flip feature in the up and down directions.

If the user presses the OK key while adaptive flip display region 400 is being displayed, the system will remove adaptive flip display region 400 and display the suggested program on a full television screen (television screen 420 in the example of FIG. 23). If desired, the suggested program may be displayed in this way when the user presses a remote control exit key of a remote control, does not take an action for a predetermined period of time, or otherwise indicates an interest in full-screen viewing. Television screen 420 may include normal-aspect-ratio video of the suggested program, Babylon 5, airing on the currently tuned channel.

Illustrative steps involved in providing an adaptive flip feature such as the adaptive flip features illustratively shown in FIG. 22 and FIG. 23 are shown in FIG. 24. At step 422, a list of suggested programs may be built for adaptive flip based on the television viewing activity of the user. The list of programs may be built from information stored in a program listings database (e.g., program listings database 64 of FIG. 24). When a user presses an up or down channel key (such as keys 92 or 94 in FIG. 2), the system tunes to the next channel on which one of the suggested programs appears and displays the adaptive flip display (step 424). For example, if the user presses the up channel key, the system tunes to the next highest channel on which a suggested program on

the list is being displayed. Intervening channels that contain non-suggested programs are skipped.

As shown in FIG. 25, the program guide of the present invention may allow the user to adjust flip settings. The program guide may display illustrative navigator display screen 426, illustrative flip setup display screen 428, and illustrative television screen 430. Navigator display screen 426 may include flip setup option 432. Flip setup option 432 may be selected by positioning highlight window 434 on flip setup option 432 and pressing an OK key. Flip setup display screen 428 may be displayed when a user selects flip setup option 432. Flip setup display screen 428 may include adaptive flip option 436 and may include "on" and "off" portions 438 and 440 associated with adaptive flip option 436. Positioning highlight flip 442 on "on" portion 438 may place the program guide flip feature in adaptive mode (i.e., selecting "ON" enables the adaptive flip feature). Subsequently, flip setup display screen 428 may be exited and television screen 430 may be displayed. When the user presses an up or down channel key to activate flip, the program guide automatically activates the adaptive flip feature.

Illustrative steps involved in providing an on-screen confirmation of an adaptive flip feature such as on-screen adaptive flip confirmation portion 370 of FIG. 22 are shown in FIG. 26. At step 442, adaptive flip mode may be enabled for example by pressing a function key, selecting an option from a browse setup display screen, pressing a dedicated button on a set-top box, etc. At step 444, on-screen confirmation of

adaptive flip mode may be displayed. On-screen confirmation may be displayed at step 444 when a user invokes adaptive flip. A user may invoke adaptive flip by pressing an up or down channel key, by pressing and
5 holding an up or down channel key for a period of time, by pressing a remote control adaptive flip function key followed by an up or down channel key, etc. For the flip (or the browse) feature, if the user presses an adaptive flip (or browse) function key just prior to
10 previously using the adaptive flip (or browse) feature, the user need not have enabled the adaptive flip (or browse) mode. If the user invokes the adaptive function by pressing a channel up or down key or other such technique, and if the program guide (or other
15 application) supports both a regular flip (or browse) function and an adaptive flip (or browse) function, then the user may be provided with an opportunity to toggle between regular flip and browse mode (adaptive flip or browse is disabled) and adaptive flip or browse
20 mode (adaptive flip or browse is enabled).

As shown in FIG. 27, the program guide of the present invention may display illustrative navigator display screen 446, illustrative setup display screen 448, and illustrative adaptive flip criteria settings
25 display screen 450. Navigator display screen 446 may include setup option 460. Setup option 460 may be selected by positioning highlight region 462 on setup option 460 and pressing an OK key. Setup display screen 448 may be displayed when the user selects setup
30 option 460. Setup display screen 448 may include adaptive flip criteria settings option 464 and other user-selectable options. Adaptive flip criteria

Adaptive flip criteria settings display

15 When the selected algorithm is current
program attributes or last displayed program
attributes, adaptive flip criteria settings display
screen 450 may include criteria setting display region
454. Criteria setting display region 454 may include a
20 list of program attribute criteria (e.g., genre, title,
actor, channel, rating, scheduled duration, etc.) and
may include adjustable importance settings associated
with each program attribute criteria. Importance
settings may be modified by the user using a remote
25 control or other suitable form of data entry.

Adaptive flip criteria settings display screen 450 may also include learning time option 456. Learning time option 456 may be used to set the minimum viewing duration for the current or last-viewed program after which the attributes of the program are used to build the list of suggested programs. A user may have the opportunity to override the minimum viewing

duration by selecting option 371 of FIG. 22 for manually selecting the current program for building a list of programs without waiting the minimum viewing duration. To build the list of suggested programs, attributes of the currently viewed or last-viewed program may be weighted using the importance settings. The resulting weighted attributes may be compared to attributes associated with program listings in a program listings database (e.g., program listings database 64). The program listings with attributes that most closely match the weighted attributes are used as program suggestions.

Adaptive flip criteria settings display screen 450 may include user identification option 458 for associating different adaptive flip criteria settings with each user. User identification option 458 may identify the displayed settings to be associated with user Mike. User identification option 458 may be selected by the user, so that the user may scan through a list of users. Later, when a given user is using the program guide (or other application), the user may direct the system to use that user's settings (including that user's adaptive flip and adaptive browse criteria settings).

As shown in FIG. 28, the program guide of the present invention may display illustrative navigator display screen 459, illustrative setup display screen 460, and illustrative adaptive flip criteria settings display screen 463. Navigator display screen 459 may include setup option 464. Setup option 464 may be selected by positioning highlight region 466 on setup option 464 and pressing an OK key. Setup display

5 settings option 468 may be selected by positioning
highlight region 470 on adaptive flip criteria settings
option 468 and pressing an OK key.

Adaptive flip criteria settings display screen 462 may be displayed when a user selects adaptive flip criteria settings option 460. Adaptive flip criteria settings display screen 462 may include select algorithm option 476. Select algorithm option 476 may provide an opportunity for the user to select the algorithm to be used to building the list of suggested programs for the adaptive browse feature using current program attributes, last displayed program attributes, or a neural network. When the selected algorithm is the neural network algorithm, adaptive browse criteria settings display screen 462 may include neural network criteria setting display option 474. Criteria setting display option 474 may include a list of program attributes (e.g., genre, title, actor, channel, rating, scheduled duration, etc.), other criteria such as percentage of program viewed, and status settings associated with each criteria. The list of program attributes may also include other related parameters that can be tagged to a program. Status settings may be set to be either enabled or disabled. A listed criteria may be used in a neural network when the associated status setting is set to enabled.

Adaptive flip criteria settings display screen 462 may also include learning time option 472. Learning time option 472 may be used to set the minimum time that a program must be viewed before the program-related criteria may be used for training the neural network. The user may have the opportunity to override the minimum viewing duration by selecting option 371 of FIG. 22 for manually selecting the current program for training the neural network without waiting the minimum viewing duration. Criteria of viewed programs may be applied to a neural network to train the neural network. To build a list of suggested programs, the program attributes of various current and future programs may be applied to the trained neural network to provide an indicator of a likelihood of user interest in each of these programs.

Adaptive browse criteria settings display screen 462 may include user identification option 480 for associating a different settings with users. For example, user identification option 480 may identify the displayed settings as being associated with user Mike. User identification option 480 may be used to scan through a list of program guide users. This allows the settings for any desired user to be changed.

As shown in FIG. 29, the program guide of the present invention may display illustrative adaptive flip criteria settings display screen 482 and illustrative adaptive flip criteria settings display screen 486. Adaptive flip criteria settings display screen 482 may include adjust neural network training option 484. Adjust neural network training option 484 may be selected by positioning a highlight window on

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